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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/026,935

Confirmation No. 7292

Applicants : Alan Sullivan et al.

Filed : December 18, 2001

TC/A.U. : 2676

Examiner : Tam D. Tran

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RESPONSE TO THE FINAL OFFICE ACTION AND INTERVIEW SUMMARY

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Commissioner for Patents
P.O. Box 1450
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JUL 29 2004

Technology Center 2600

Sir:

Applicants respectfully submit the following remarks to summarize a June 30, 2004 telephonic interview between the undersigned attorney and Supervisory Patent Examiner Matthew C. Bella and Examiner Tam D. Tran and to also respond to the March 23, 2004 Office Action:

REMARKS

Claims 1, 2, 4-9, 12, 13, 16-23, 47, 48, 50-55, 58, 59 and 62-91 remain pending in this application. None of these claims is being amended by this Response. Reconsideration and allowance of all of the pending claims in view of the following remarks are respectfully requested.

At the outset, the undersigned would like to express his appreciation to Supervisory Patent Examiner Matthew C. Bella and Examiner Tam D. Tran for the courtesy of reviewing the file and cited prior art in advance of the June 30, 2004 telephonic interview and discussing the novelty of the pending claims with respect to U.S. Patent No. 5,706,816 to Mochizuki et al. ("the Mochizuki Patent") during the telephonic interview. The Mochizuki Patent had been relied upon by the Examiner in the previous Office Actions in making prior art rejections. As a result of the June 30, 2004 telephonic interview, the Supervisory Examiner agreed that the pending claims were distinguishable over the Mochizuki Patent.

The interview focused on discussing the differences between the cited Mochizuki Patent and the pending claims which stand rejected (i.e., Claims 1, 2, 4-9, 12, 13, 16-23, 48, 50, 51-55, 58, 59, 62-69, 76-91) in the March 23, 2004 Office Action as being anticipated by the Mochizuki Patent. During the telephonic interview, Applicants' attorney explained that the instant invention, as claimed, requires a multi-frame buffer in that it is directed to processing image data to be displayed on a three-dimensional volumetric display. This is discussed in the application with reference to FIG. 1 thereof and examples of three dimensional volumetric displays are more fully discussed in U.S. Patent No. 6,100,862, which is incorporated by reference in the instant application. In such three-dimensional volumetric displays, the display elements occupy a volumetric region of space. In such display, and assuming a Cartesian coordinate system, for example, it is necessary to arrange image data having (x, y, z) coordinates in a way that

permits mapping of the image data onto the display elements of the three-dimensional volumetric display. In the instant application, this is accomplished by providing a multi-planar frame buffer which stores the three-dimensional image data in accordance with the z-coordinate of the data that denotes the depth axis. This is the basis for Claim 1 and the other pending claims which stand rejected as being anticipated by the Mochizuki Patent.

During the course of the telephonic interview, the Mochizuki Patent was distinguished over the pending claims for the following reasons:

The Mochizuki Patent is directed to the processing of ultrasonic images which are acquired over a volume of space by mechanically scanning the ultrasound probe 22 in the z-direction (*see* FIG. 1 of the Mochizuki Patent). However, the Mochizuki Patent makes clear that this three-dimensional image data is processed for display on a two-dimensional screen (*e.g.*, a CRT) by inputting the z-coordinate data denoting the direction of the ultrasound beams into a digital scan converter (DSC 28). DSC 28 computes brightness values $P(x,y)$ of a pixel corresponding to the ultrasonic beam along which the data has been processed and stores these brightness values $P(x,y)$ into a frame memory having "X-Y addresses corresponding to the pixels of a display screen." (*See*, Mochizuki Patent, Col. 8, lines 31-54 and Col. 8, lines 62-Col. 9, line 1). The data read from this two-dimensional frame buffer is thereafter converted into an analog signal and "sent to a display 42 such as a CRT." (Col. 9, lines 20). As explained in more detail in the Mochizuki Patent, the voxels of image data along an ultrasound beam direction are

sequentially processed to produce "a brightness value $P(x,y)$ of [1] pixel in the ultrasound image 100 on a display screen." (Col. 11, lines 51-56).

In short, while the brightness data is computed by making use of the z-coordinate data to define respective ultrasound beams and their respective voxels, ultimately, the data to be displayed is condensed and stored in a two-dimensional x-y frame memory for display on a conventional two-dimensional x-y display (e.g., a CRT). Accordingly, the Mochizuki Patent is not at all directed to processing data for display on a true three-dimensional volumetric display system. Nor does it disclose or even suggest a multi-frame buffer for storing three-dimensional image data at address locations in accordance with the z coordinate of the data.

At the end of the telephonic interview, Supervisory Patent Examiner Matthew Bella acknowledged that he agreed with the distinctions being made over the prior art Mochizuki Patent and that it had been improperly applied against the claims. He stated that upon receiving this Response, it would be appropriate to withdraw the rejections based upon the Mochizuki Patent and the "final" status of the March 23, 2004 Office Action. However, he indicated that an additional prior art search would probably need to be performed.

Applicants respectfully submit that, in view of the inapplicability of the Mochizuki Patent to the pending claims, the pending claims are all in condition for allowance. Accordingly, it is respectfully requested that the Examiner allow the pending claims, absent a citation of any pertinent art.


Appl. No. 10/026,935
Response dated July __, 2004
Reply to Office Action of March 23, 2004

Included herewith is a petition for a one-month extension of time for response. A check in the amount of \$55.00 is also included herewith to cover the fee for the one-month extension of time for response for a small entity. No additional fees or extensions of time are believed to be due. However, authorization is given hereby to charge Deposit Account No. 01-1785 for any deficiency in fees necessary to preserve the pendency of the subject application, or to credit the same in case of overpayment.

Respectfully submitted,

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Dated: New York, New York
July 21, 2004

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